

156. I 91-1 ♂. *Astycus augias augias*, L.
 157. I 91-2 β. *Astycus pythias bambusae*, M.
 Both common.
 158. I 97-24 β. *Baoris conjuncta javana*, Mab.
 159. I 97-33 β. *Baoris zelleri cinnara*, Wallace.

There were several other *Baoris* that I did not catch or identify. *Conjuncta* was not rare, *zelleri* common.

ANALYSIS

Number of species and forms, excluding seasonal forms, found to occur in the area :—

<i>Papilionidae.</i>	15
<i>Pieridae.</i>	21
<i>Danaidae.</i>	15
<i>Satyridae.</i>	9
<i>Amathusiidae.</i>	1
<i>Nymphalidae.</i>	35
<i>Erycinidae.</i>	2
<i>Lycaenidae.</i>	40
<i>Hesperiidae.</i>	21

Total 159

A NEW PEST OF SUGARCANE IN INDIA—*ICERYA PILOSA*
NARDI GREEN (COCCIDAE).

(With two plates.)

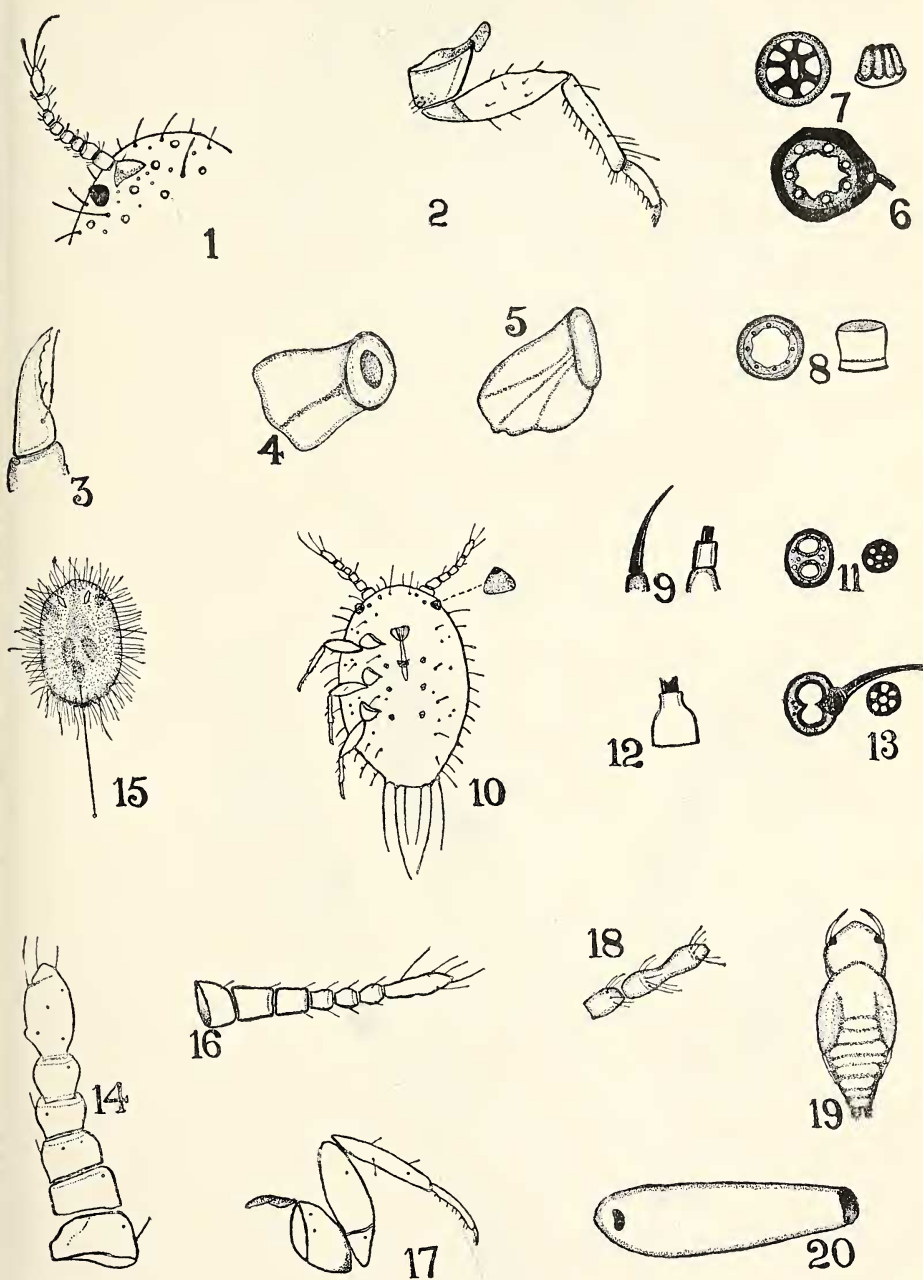
BY

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INTRODUCTION.

While engaged in the study of the pests of sugarcane under the Imperial Council Scheme for Research on Insect Pests of Sugarcane, the writer came across a large mealy-bug doing considerable damage to very young sugarcane seedlings at Coimbatore, South India. Specimens were identified as *Icerya pilosa nardi* Green. The species was originally described by Green (1922) as *Icerya seychellarum* var. *nardi* from 'a single specimen found on mana grass (*Andropogon nardus*) on uncultivated land at Diyatalawa, Ceylon', and later on regarded it as *Icerya pilosa* var. *nardi* (1937). This is the first record of the species from the mainland of India and mentioned by Isaac (1937) as noticed for the first time on sugarcane in India. Since then a number of coccids including the above one, attacking sugarcane in India, are listed by Pruthi and Rao (1942).



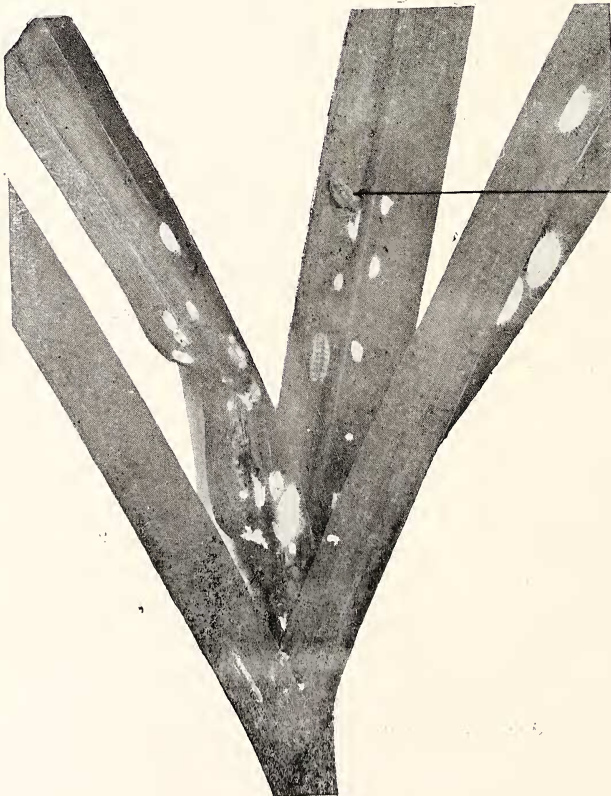
Icerya pilosa nardi Green.
 (For explanation see end of article.)

T. W. del.



f

1



C.g.

2

lccrya pilosa nardi Green.
(For explanation see end of article.)

NATURE OF DAMAGE, FOOD PLANTS, AND DISTRIBUTION IN INDIA.

The pest was first noticed on young sugarcane seedlings in all stages of development, mostly on the under surface of leaves. The nature of the injury caused is the extraction of the sap and the consequent weakening of the plant. In the case of very young seedlings, the leaves turn yellowish and the plants invariably die.

The choice of the food plant by this insect appears to be limited within the family Graminae. In addition to sugarcane it is found attacking *Saccharum spontaneum* in Coimbatore and *S. ravennae* Linn., in New Delhi.

This mealy-bug is recorded from Delhi, Karnal, Meerut and Coimbatore.

MORPHOLOGICAL NOTES

THE FEMALE

First-stage nymph (Pl. I, figs. 10-12).

It is more or less oval and brick red in colour. The dorsum has a thin coating of waxy secretion. The limbs and antennae are well developed and greyish in colour. The antenna is six-segmented, the terminal being the longest. There are two kinds of ceriferous pores on the dorsum; six bilocular pores along the median line and numerous small multilocular pores distributed all over the dorsum. There are six long setae with well developed collars in the anal region. The first pair of spiracles alone are present at this stage. Length 0.6 mm. to 0.7 mm.

Second-stage nymph (Pl. I, figs. 13-15).

The antennae are stouter, the first, second and third segments are thick and the rest are basally constricted. The terminal segment shows a distinct division making it seven-segmented. The bilocular pores found in the first stage lose the central partition and become unilocular, highly chitinised, and each pore bears a seta. The multilocular pores increase in number. Length 1.8 mm. to 2.0 mm.

Third-stage nymph (Pl. I, figs. 16 and 17).

This stage resembles the adult female in all respects except in size. The antenna is distinctly seven-segmented and all the segments are provided with long hairs. Both the pair of spiracles are present, the anterior being irregular in shape. The tibia is slightly arched. The tarsal claw is long and provided with two denticles on the inner surface. The anal ring is heavily chitinised. Length 2.7 mm. to 2.9 mm.

Adult female (Pl. I, figs. 1-9 & Pl. II, fig. 1).

The adult female, just before gestation is quite red in colour. The dorsum is highly convex with a dense coating of white meal. Long waxy filaments are present all over the dorsum, which are more numerous towards the posterior end. The posterior extremity carries a brush of stout mealy processes. The limbs and antennae are dark red in colour. Length 4.9 mm. to 9.9 mm; breadth 2.4 mm. to 3.8 mm.

The species resembles *I. pilosa* Gr., in all morphological characters except in its larger size and in the possession of distinctly serrate claws. Green (1937) thinks that 'it may eventually prove to be a distinct species'.

THE MALE

The first and second instars are similar to those of the female.

Third-stage nymph.

Sex differentiation takes place soon after the second moult. The male nymphs at this stage are distinguished from those of females by the longer abdomen.

Fourth-stage nymph.

At this stage the male is very much elongated and the head is clearly marked out from the rest of the body. The wing pads also have made their appearance. The anal end of the abdomen is prominently bilobed and fleshy. The body is practically devoid of any mealy secretion. Length 3.1 mm. to 3.4 mm.

Pupa (Pl. I, fig. 19).

The pupa is distinguished by the presence of prominent wing pads and well developed anal appendages. The antennae are also very much elongated. Length 3.0 mm. to 3.2 mm.

Male cocoon (Pl. I, fig. 20).

The cocoon is elongated and loosely constructed of waxy filaments. It is partially open at the posterior end. Length 8.0 mm. to 9 mm.

Adult male (Pl. I, fig. 18).

The male is reddish in colour with a thin coating of white meal: eyes dark red in colour and very prominent. The antenna is ten-jointed and with bi-nodose joints. The abdomen is provided with a pair of fleshy appendages, each carrying 6 to 7 long setae. Length 2.7 mm. to 3.7 mm.

MATING, EGG-SAC FORMATION AND OVIPOSITION.

Males are very much fewer in number than the females. The male, soon after emergence, wanders about for some time before it selects a female for copulation. The whole process of copulation lasts from 4 to 6 minutes. A single male was observed to copulate with more than one female during the course of one hour.

Although copulation was observed in a few cases parthenogenesis appears to be the usual mode of reproduction as in other *Iceryine* coccids. Hughes-Schrader (1930) has studied in detail the life-history of some *Iceryine* coccids and has concluded that parthenogenesis is characteristic for the genus as a whole. She thinks that 'copulation may occur between the hermaphrodites and the occasional males but it is no wise for reproduction.'

The adult female, before gestation, anchors itself near the base of the leaf and from the pores of the ventral band the waxy threads begin to issue to form the ovisac. The ovisac so formed remains partially covered under the posterior waxy processes of the female. Oviposition commences as soon as the lower layer of the ovisac is formed, the female continuing to lay eggs for about three weeks. In the laboratory a total of 49 eggs were laid by the largest female, a smaller one laying 32 eggs.

LIFE-HISTORY.

The first young hatched in about a week after the formation of the lower layer of the ovisac. The average duration of the egg stage was found to be 9 days. The newly-hatched nymph remains inside the ovisac for some time before it comes out. The earliest first moult occurred 17 days after the first egg had hatched. The average duration of this instar was found to be 19 days. In moulting, a small cleft appears at the anterior end of the nymph and it slowly makes its way out, dragging the body, the whole process lasting from 4 to 5 hours. The earliest second moult occurred 16 days after the first moult; the average duration of the second instar was 21 days.

Sex differentiation takes place in the third instar. The average duration of the third instar of the female was found to be 18 days. The total average